



جامعة صنعاء
كلية الطب والعلوم الصحية
دائرة العلوم السريرية الطبية
دفعة بصمه طبيب 31
طب بشري

OPHTHALMOLOGY



Cornea

Lecture No. **15**

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جروب ((C))

اللجنة العلمية لدفعة بصمة طبيب 31

مندوب الدفعة

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« Cornea »

د. ابراهيم الوزار

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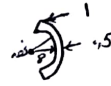
- eyeball has coats → outer layer is sclera → anterior continuation is cornea 1/6, It's Transparent and avascular.

- Cornea is protective but mainly it's refractive

- Vertical Diameter = 11 mm

Horizontal D. = 12 mm

Thickness = 0.5 mm in the center
1 mm at the limbus



Radius of curvature → anterior = 7.8 ≈ 8 mm

- cornea is the main Refractive Surface of the eye = 42 Diopters

N.B. Refractive power of the lens = 18 D. Eye ≈ 60 D.

- Refraction + optics

الانكسار والبصريات

▷ Refractive power:

Ability of convergence of parallel rays, Affected mainly by curvature and RI

الانكسار، خاصية مماثلة لكوني ضوء سريع في الهواء في الفراغ

No medium can Light go faster than that because it's space

Space = 1 any other medium Transparent it will be > 1

- Any object « rays » From infinity or Far comes slightly divergent but for eye at more than 6m comes parallel at least 1/6 of Diopters eyes converge rays correctly.

- Retina has Macula then Fovea then Foveola → deeper to the center more CONS to do resolution For pictures. Thereby convergence is needed to get rays at Fovea.

That's the job of cornea & lens

- Cornea converge parallel rays and Through pupil
refraction by crystalline lens to Fall in Fovea $\leftarrow$ Emmetropia $\rightarrow$
- $\rightarrow$ IF Falled befor Fovea $\rightarrow$ Myopia
- $\rightarrow$ IF Falled after Fovea $\rightarrow$ Hypermetropia

- Curvature of cornea is important in refraction power
Low of refraction:

Snellen's Law $\rightarrow$ Dioptric Power For any shape affected mainly by curvature & Refractive index.

N.B
R.I = 1.37 * Reversibly proportional. إذا زاد الانحناء زاد البعد
إذا قل الانحناء قل البعد
Dioptric Power $\leftarrow$ curvature

IF Diameter less than V.=11 A.=12 $\rightarrow$ microcornea
IF big corneal diameter $\rightarrow$ megalocornea may be c.t. Glaucoma.

- Thickness

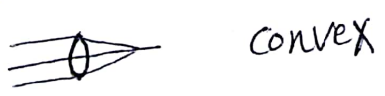
central = .5 mm peripheral = 1 mm. كل نقطة في القرنية لها انحناء مختلف

This is important in Refractive surgery

Radius of curvature = 7.8 anterior $\rightarrow$ Less toward the periphery
going Flattered k_1 very , k_2 relatively . A-spherical shape $\rightarrow$ steeper in center
For refraction $\rightarrow$ Flattered periphery Less refraction $\rightarrow$ This is a feature called A-spheric surface

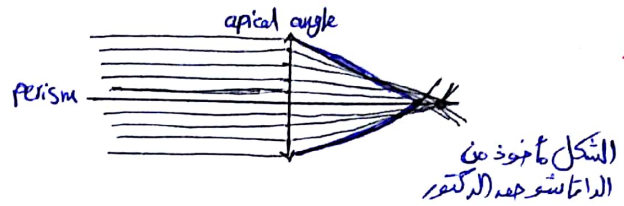
- plus Lens «high» $\rightarrow$ converge

- Minus Lens $\rightarrow$ Divergent



لو كانت Spheric في الوسط والاطراف. يصحى Refraction error

- Spherical Aberration



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ببساطة وجود عيوب في plus lens في ال periphery
 مثال عندنا قطر توضع pupil يتلخبط النظر، بحسب ان apical angle
 في ال periphery عاليه، فحينما نضيق pupil تلغي كل refraction in periphery
 هذا هو spherical Aberration

- cornea if steep further $\rightarrow$ myopia
 if flatter further $\rightarrow$ hypermyopia
- Astigmatism can be diagnosed by Retinoscope.
- الدكتور تكلم كثير على investigation of القرنية 146
 cornea
- Epithelium of cornea comes from surface ectoderm.
- Stroma more than one origin.
- Any systemic disease affect the skin then epithelium of conjunctiva & cornea are affected because they come from same origin.
- Histology of cornea : A B C D E
 - 1- Anterior Epithelium
 - 2- Bowman's membrane
 - 3- central stroma
 - 4- Descement's membrane
 - 5- Endothelium



- Corneal nutrition:

- 1- Limbal capillaries. main source
- 2- Tear film.
- 3- From aqueous humor.

- State of relative dehydration $\rightarrow$ by endothelial pump.

N.B Epith. has a high regenerative power $\rightarrow$ any abrasion $\rightarrow$ complete healing

Bowman's m. Not capable of regeneration. If injured $\rightarrow$ Fibrosis $\rightarrow$ Corneal opacity

- anterior $1/3$ of Lamella obliquely oriented not parallel while posterior $2/3$ Lamella parallel to others preventing scattering of light. Sclera is opaque not parallel **N.B**

- Corneal Transparency: «الشفافية»

- 1- No pigments in it
2. No blood vessels $\rightarrow$ by Diffusion.
3. Regular arrangement of Lamella.
4. Corneal relative dehydration (pump mechanism)

- Nerve Supply: «إعصاب»

Sensory ~~fibers~~ From the 2 Long ciliary nerves

5th (Trigeminal) $\rightarrow$ ophthalmic n. $\rightarrow$ Naso ciliary n. $\rightarrow$ Long P. ciliary N.

- Limbus (corneo-scleral junction). «الحد» «الحد الفاصل بين القرنة والسclera»

- Corneal Examination, signs & symptoms. «الفحص» «العلامات والأعراض»

- punctate erosion Small depression in cornea.

- Punctate keratitis Small elevation "Follicles" appear in Rose Bengal stain.

- Laceration Penetrating injury reach stroma

- Ulcer Discontinuation of epith. reach BM, stroma, DM
when heal Leave a Scar

- Pathology of cornea.

Classification according to ulcer formation.

► Corneal ulcer:

- primary
- secondary

► Non ulcerative

- superficial keratitis
- deep keratitis

Classification according causes.

- Infective
- Non infective

- H. Influenza.

N.B - Neisseria gonorrhea. penetrate through intact epithelium.

- Diphtheria.

- الذئبة عرقية، التهابات القرنية وفقرات بينية، مكتوب في كل صورة (التهق) والواصفات، يفضل الرجوع للكتاب أو الملتصق باليد.

- It's preferred to use combined Antibiotic for Almost All cases
Ceftazidime & Vancomycin.

- Stem cells in epithelium → How many circumference damage → if alot
→ bad prognosis

- Herpes Simplex: Two Type

Above waist Type 1 Ocular infection.

below waist Type 2 Genital Type → ophthalmia neonatorum.

N.B Dendritic shape because it goes with nerves

- Desciform herpes «wessely ring»

Disc shape → Deeper.

- Herpes Zoster $\Rightarrow$ Herpes Zoster ophthalmicus.

Following branches of Trigeminal n. $\rightarrow$ ophthalmic n. $\rightarrow$ Naso ciliary N.

$\rightarrow$ Tip of Nose + ciliary body

N.B Hutchinson Sign:

① erythema & oedema ② vesicular ③ Pus ④ rash ⑤ Healed with scarring

In Acute HZO $\rightarrow$ Dendritic with Tapered ends

In chronic HZO $\rightarrow$ Scarring in stroma, Atrophy of Iris

- Systemic Signs of Congenital syphilis.

① saddle shaped nasal deformity

② Sabre tibiae.

③ Hutchinson teeth.

- Complications of Ulcer

- Treatment

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- Corneal opacity.

Nebula, Macula, Leucoma $\begin{cases} \text{Adherent} \\ \text{Non Adherent} \end{cases}$

- corneal Ectasia.

- keratoconus

- kerato globus

- pellucid marginal degeneration.

- Signs of keratoconus. **N.B**

1- Oil droplet reflex

2- Vogt Striae

3- prominent corneal nerve

4- Scarring

5- munson sign / Bulging of Lower lid on downgaze.

6- Acute hydrops $\rightarrow$ destruct endothelium $\rightarrow$ water into stroma $\rightarrow$ suddenly blindness
Keratoplasty is useful.

- Congenital Corneal anomalies.

- 1- micro cornea
 - 2- Megalo cornea
 - 3- Sclero cornea
 - 4- Keratoglobus - Keratoectasia
 - 5- Cornea plana → small curvature
- Anophthalmos → No eye
 - Nanophthalmos → Small eye



- perforation → central → corneal fistula
→ peripheral → Leucoma adherent.

- Seidel test → Leakage of aqueous from A.C → corneal laceration.

- Stages of corneal ulcer.

- 1- stage of infiltration (progressive)
- 2- stage of ulceration
- 3- stage of healing or regeneration
- 4- stage of scarring

- Hypopyon ulcer.

- ▶ Disc shape ulcer (sterile pus). Hypo = down Pion = pus
- ▶ Healing edge: Towards the Limbus. Advancing edge: Towards the center.

- Arcus senilis.

Bilateral annular infiltration of corneal periphery by Lipoid Material

- Corneal Degeneration, Corneal Dystrophies.

الترسبات 103

- Signs of graft rejection .

- Epith. - Linear epithelial opacity
- Subepithelial opacity

Endo. - Iritis & inflammation at Junction

- Endothelial precipitate (Keratic precipitate line)

- Peripheral corneal thinning & ulceration

N.B without systemic disease:

- Dellen - حفرية من جرحه
- Terrien marginal degeneration
- Mooren Ulcer < Limited → unilateral → elderly
progressive → bilateral → young

with systemic disease:

- Rheumatoid arthritis
- Wegener granulomatosis
- Polyarteritis nodosa

* Refractive Surgery .

N.B

- الدكتور جاب ملغان اخافه يوجد فيها حصى عيني فقام بإجراء العملية

باعتها
أناها
المسورة

